
The Evolution of E-Money

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Abstract:

The aim of the article is to analyze the stages in the evolution of electronic money. The research methodology is composed of the evolutionary theory of the origin of money and the theory of money and credit developed by the Austrian School of Economics. The emergence of cryptocurrency is seen as the next stage in the process of money evolution.

The article concludes that it is cryptocurrency which can truly be considered electronic money as it exists only in electronic form and is in no way connected to the objects of the material world. As a result, cryptocurrencies have several advantages when compared to other forms of money.

Key Words: *Electronic money, gaming currency, virtual currency, cryptocurrency, Bitcoin.*

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Introduction

This paper analyzes the concept of electronic money in the context of the evolutionary theory of the origin of money and put forward the hypothesis that the emergence of cryptocurrency was the next step in the evolution of money, which resulted due to the presence of objective disadvantages of unsecured paper money.

Literature review

The concept of electronic money is rather ambiguous. Under the electronic money, people often understand the accounting system of rights to public and private currency. Currently, these systems use electronic storage media. However it is useful to note, that such systems, as well as non-cash payments, were around thousands of years ago (Rupeika-Apoga and Nedovis, 2015; Thalassinos, 2008; Thalassinos and Kiriazidis, 2003). Thus, the modern electronic system is only an advanced version of the thousand-year-old technology.

While investigating electronic money from such perspective it can be said that the modern means of bank account access: bank payment cards and internet banking are not electronic money, as these systems simply allow operations with real money held in bank accounts. In other words, these products only provide means of access to real money (Huerta de Soto, J. 2008; Allegret *et al.*, 2016; Boldeanu and Tache, 2016; Fetai, 2015; Glavina, 2015).

The problem is somewhat complicated by the fact that all modern banking system uses the principle of fractional reserve funds that were deposited (demand deposits and current accounts), that, in fact, is a fraud (Arslan-Ayaydin *et al.*, 2014; Grima *et al.*, 2016; Suryanto, 2016; Thalassinos *et al.*, 2013; Thalassinos *et al.*, 2015). The use of this principle leads to the fact that the banking system as a whole assumes obviously impracticable obligations, leading to the fact that the volume of bank liabilities (non-cash) far exceeds not only the quantity of cash available in the banking system, but the entire amount of real money in the monetary base of the economy (Rothbard, 2003; Hamid and Won Kie, 2016; Tcvetkov *et al.*, 2015).

On the other hand, the emergence and development of means of Internet payments (Webmoney, Yandex, through QIWI, etc.) led to the fact that there were types of payment instruments which, although not related to the procedures of opening a bank account, were based on P2P lending of real money and recognition of the rights to these funds through the ledgers. Thus, the essence of this phenomenon is similar to the “non-cash money”. However the problem of fractional reserve is still present here.

It is obvious that the number of phenomena that have grown in recent years and are interpreted in the literature as "electronic money" have nothing different from other

money substituents which are backed by real monetary units such as: rubles, dollars, gold, etc.

For example, in order to obtain electronic money (title characters) WMR, issued by the Webmoney, it is necessary to transfer the corresponding amount in rubles to Issuer's account. Of course, you can get these title characters from another user in the system, but the original source of all the characters is the issuer, that is committed to exchange titular characters for real currencies. The same applies to other similar payment systems: «Yandex Money», «QIWI».

As a result, "electronic money" is created on the basis of the existing monetary units, simply replacing them in certain sectors of the economy. Of course, the issuer is able to release a larger amount of "electronic money" as opposed to real money, i.e., to act on the principle of fractional reserve. However, it does not mean that "electronic money" is essentially the new kind of money, because this feature can be inherent to any cash substitutes.

We can say that the modern "electronic money" is a natural stage in the evolution of means of payment. However, the novelty of "electronic money" is only a technical aspect. "Electronic money" is not a phenomenon of information. They are for information only in the sense that they are the information on the movement of the rights of ownership of real monetary units. Similarly, payment instruments used in the organization of cashless payments provide identical information.

In systems that perform transactions using 'electronic money', bank accounts are only used when depositing and withdrawing money from the system, which once again confirms their nature as cash substitutes.

Similar to any cash substitute, "electronic money" cannot physically be more reliable than the entity issuing them. Any money substitute assumes the existence of a mediator, i.e., the person who accepted the obligation to exchange money substitute for real money. In the XIX century the role of such intermediaries was devoted to banks issuing banknotes that could be exchanged for gold. Nowadays, payment systems, issuing "electronic money", are the intermediaries responsible for the exchange of electronic money issued by them in exchange for real money (Shostak, 2016).

Methods of carrying out research

The research methodology is the evolutionary theory of the origin of money and the theory of money and credit developed by the Austrian School of Economics. The emergence of cryptocurrency is seen as the next stage in the process of money evolution.

Results

1. The development of cryptocurrency is the new stage of money evolution

The development of IT technology and the emergence of the global network led to development of online games, social networks and other online communities. Those, in turn, gave rise to virtual currency and game currency, which were used to pay for services provided within these online structures.

Virtual or game currency is a type private (non-fiat) electronic money used for purchase and sale of virtual goods in various online communities such as: online games, social networks, etc.

Every online game has a contest between people in the virtual world. The internal game currency created as part of the virtual game world in which there is some economic component present. Virtual currency, in this case currency emitted by the game itself, is in accordance with an algorithm installed by the game developer. Usually it is awarded to players according to their achievements in the game or through the purchase using real money (state currency). This allows players who have achieved certain achievements, to strengthen their position by buying in-game virtual goods - items that give them an advantage over other players. Thus, the virtual currency is purposefully created as a limited resource in the game. This is achieved through the creation of game developer specific set of virtual goods sold for real money.

Similar goals pursued by the creation of virtual money in social networks.

Any modern social network and online game is above all an enterprise that spends real resources: labor force of programmers, capital in the form of computers, servers, electricity, etc. Because of this, such projects cannot exist without bringing real income. Monetizing customer base, i.e., converting the real popularity of the project into a cash generating activity is a necessity.

Initially, popular online games used a subscription mechanism, or a monthly fee. They demanded a fixed fee for a certain period of use of the game. This option of generating in-game revenue didn't require the link of internal game currency with real money. However, a significant number of users considered the introduction of a fixed fee worthwhile. This reduces the actual customer base relative to potential. In simple words, the monthly fee does not allow to "pull out" the maximum amount of money from the consumer.

Another way to monetize gaming projects was to simply sell virtual currency for real money. By doing that, the user was able to gain advantage over other players through the purchase of virtual goods. At the same time the game itself can be free to download. This method can significantly improve the monetization of gaming projects and social networks. This is achieved by the fact that the user pays as he plays.

The next stage of the development of game currency is the ability to reverse currency exchange from game currency to real money. This scheme is not widespread due to lack of interest of game developers to reduce their income.

At the same time, transition to this scheme requires the producer to allow the transfer of the internal game currency directly between the players. In this case, the game currency market will emerge without the participation of the developer.

Despite the fact that the game currency invented by people consciously and solely as a means of payment, it already possesses some value at the time of its inception, as a game developer at the same time with the creation of the currency also created virtual goods that can be bought for hard currency.

In addition, the developer has also defined a fixed rate of game currency for real-world money. We can say that the game currency becomes just another mediator between the user's desire to purchase a virtual good and his actual possession. Instead of having to buy virtual goods for real money, he bought virtual currency for real money, and only in exchange for virtual currency he may obtain the virtual goods. Often, this intermediate process is invisible to the user. Wanting to purchase virtual goods, he simply pays his credit card or other possible means (electronic money).

Thus, despite the fact that the game currency was consciously designed as a means of payment, it is able to function as money for the reason that the developer endowed it with value that has some significance in the virtual world that it operates in. It has a relationship with the "everyday money" recognized by society through a fixed exchange rate set by the developer. For this reason, virtual currency can hardly be called fully-fledged electronic money.

The next step in the development of virtual money was the emergence of so-called cryptocurrency, the first of which was a bitcoin. In fact cryptocurrency is what can be truly classified as electronic money, if understood by those means of payment available only in electronic form and in no way connected (attached or secured) to the objects in the material world. Cryptocurrency is a form of money that exists solely as information and has no other form of existence.

"The Bitcoin, (English bit – "Unit of information") – is an electronic monetary system, established in 2009.

The principal difference between Bitcoin and other systems of e-money is that bitcoin is not a monetary substitute. It is not secured by anything. Its issuer is neither a specific person, nor a participant of the system. However, nobody at the time of issue of bitcoin, does not undertake any obligation to exchange it for something else at a fixed rate.

The unit of account in the system is one bitcoin. The minimum amount of the transaction is 10^{-8} Bitcoin.

Bitcoin system operates on the basis of open-source software, eliminating the presence of hidden "loopholes" and undocumented features in the system, which partially guarantees its reliability.

Bitcoin forms an ad hoc network, i.e., it does not provide for the presence of any governing body. The system operates just as the interaction between users. Here, however, it should be noted that since September 2012 the support system provides an organization called the "Bitcoin Foundation".

Bitcoin is not dependent on any central institution, dealing with the emission of currency. Currency can be issued by any user in the system. The data on the movement of money is stored in a distributed database located on the users' computers. Database synchronization happens automatically between participants, using an in-built peering network technology protocol (protocol similar to that used by torrent network).

System reliability is guaranteed by the use of cryptographic protection.

Bitcoin can be sent to any user, using Bitcoin network address. However, this address is guaranteed complete anonymity, because it is a simple combination of letters and numbers, such as this: «1D5wZqCjxNuPqfUN3RMFsxxxxtqRBwiAeTZ».

Bitcoin database stores information about all transactions, i.e. moving currency from one address to another and etc.

User of the system holds a file that acts as a key to Bitcoin addresses connected to it. The connection of this key with the database through a special program-purse via the Internet, allows you to append recording of transactions in the database, i.e. make payments. Payment is carried out immediately, but to be sure getting Bitcoins must wait for the so-called "evidence." As a result, the payment can take from 10 minutes to 1 hour, significantly faster than a bank transfer, but slower than the operations in centralized systems of electronic money (Webmoney, QIWI, etc.) where the transactions take seconds (Vlasov, 2014).

Bitcoin system does not provide for mandatory fees, however, commissioned transactions are carried out faster.

We can say that Bitcoin is a system of electronic cash. This refers to the fact that the loss of the key file leads to the loss of Bitcoins as access to the relevant addresses will not be possible. Abduction of the key file is similar to the theft of cash.

Storage of the file is similar to storing money in your wallet. Theft of the key file can also lead to loss of Bitcoins.

Speaking about Bitcoin, as a system of electronic cash, it must be remembered that this is only a metaphor. Receiving Bitcoins to your address does not require connection-wallet program to the internet. All of that is necessary for the person paying, but not for the one receiving the payment. It is the payer that makes additional entries in the transaction database.

The principle of an ad hoc network and the lack of a single central institution make it impossible for government to intervene and manipulate the course through a change in the money supply.

Currently, the principal amount of bitcoins is already issued.

The rate of emission of bitcoins has an inflexible algorithmic limitation. As a result, the total number of bitcoins at any given time is limited. The algorithm provides for a slowdown of the emission rate. After the issue of 10.5 million Bitcoins, emission rate will decrease by half. Once 15,750,000 Bitcoins are issued, emission rate will decrease two times and so on. As a result, the total Bitcoin amount will not exceed 21 million.

Table 1. The number of bitcoins in circulation

Date	The number of Bitcoins in circulation	The growth rate for the year%
January 2016	14.44 million.	+ 10%
January 2017	15.75 million.	+ 9.1%
January 2018	16.41 million.	+ 4.2%
January 2019	17.06 million.	+ 4.0%
January 2020	17.72 million.	+ 3.9%
January 2021	18.37 million.	+ 3.7%
January 2022	18.70 million.	+ 1.8%

There was an opinion that the Bitcoin cannot survive for a long time. The appreciation of the exchange rate is considered only speculation, such as the "Tulip Fever" in the Netherlands in the first half of XVII century. There will come a point in time when the rate begins to fall. In this situation, it can go down to zero, because bitcoin has no support in the form of material backup. People will lose their trust in the currency and it will cease to exist. However, this still hasn't happened.

The belief that the end of Bitcoin speculation will lead to the collapse of the payment system is based on the fact that, in the event of it collapsing to zero, there is no return mechanism to facilitate or manipulate the exchange rate back to normal. Since Bitcoin does not have non-monetary demand, there will be no mechanism, which then pushes up the exchange rate. However, these considerations have not yet been confirmed by the facts. Moreover, such arguments ignore the fact that the original Bitcoin was nothing and was able to obtain monetary value on the basis of demand.

The emergence of cryptocurrency was a natural step in the process of the evolution of money. The process of evolution is to overcome obstacles to development. Its driving force is rationality. Any phenomenon is evolving; trying to get around the obstacle in the most optimal way.

2. Bitcoin system lacks the disadvantages of unsecured paper money: state intervention and resulting inflation

The development of monetary relations within the society faced the aggressive military intervention organized groups of individuals. The emperors, feudal lords, and later the state throughout history have used inflation as a monetary resource withdrawals tool, i.e. theft (Vlasov, 2012a). However, by the end of the twentieth century, the state was able to subordinate monetary sphere dictating its power, replacing money with unsecured paper money. This allowed to significantly increasing the scale of inflation-triggering processes, and the amount of resources redistributed in favor of the state and stakeholders (Vlasov, 2012b).

Activities of the State in the monetary field is "parasitic" as the mechanism of inflation takes away from the good of society, and redistributes them in favor of "parasites" - those who do not produce. It is natural that the society for its own survival must put in efforts to resolve this forceful intervention in the monetary system. One way is to create a new form of money. This form will not have the disadvantages, allowing the state to pursue a policy of inflation.

The disadvantage of gold as a form of money is that it is an object of the material world; it can be taken away, what the state has eventually done. Any material objects can be attacked.

The development of information technology, which began in the late 20th century led to the fact that people have tried to create a new form of money - cryptocurrency in which money does not exist materially, and there is only a certain algorithm, the reliability of which is determined by the computing operations mathematics. Intangible cryptocurrency have an advantage compared to gold (Vlasov, 2015).

According to the Bitcoin algorithm, the total number of bitcoins is limited, which does not allow infinitely increasing their number to carry out a policy of inflation. This is a significant advantage of this currency, including in relation to gold for instance.

So far a ways hasn't yet been found to break the algorithms and the functioning of the system of cryptocurrency. It remains an open question as to whether cryptocurrency is able to compete with gold for the status of money, because gold cannot largely fulfill the function of money due to risk of government intervention. While the State is attempting to fight cryptocurrency, it does not have, at present, any effective means of combating this phenomenon that gives cryptocurrency advantage over gold.

Discussion

Therefore, the evolution of electronic money has led to cryptocurrency having the following advantages compared with other forms of money:

- Completely immaterial form of money which has no collateral;
- The inability of state control over cryptocurrency;
- The impossibility of carrying out the policy of inflation.

Because of this, it is necessary to say that cryptocurrency is a consequence of progress. This phenomenon will contribute to the development of society and economy. However, the greatest advantage of these technologies will go to those countries in which the state will not prevent the spread of this phenomenon. Economies of the countries in which the state will prevent the development and spread of these technologies will lag behind others and will be forced to adopt the technology.

Conclusion

Based on this study it can be concluded that the evolution of electronic money has led to a cryptocurrency having significant advantages over other forms of money, which confirms the hypothesis put forward by the author.

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